ROYAL NAVAL GUNNERY

IN WORLD WAR TWO

Handbook on 1941 Naval Gunnery Organisation - OU 5437 which became National Archive ADM275/10

EQUIPMENT FITS, TECHNIQUES, INSTRUMENTATION AND FACILITIES - and in the distance, the sound of big guns being fired: read on! If you find that the gun shots hurt your ears, scroll down the page to the applet to switch the motion/sound off. Also, use your Refresh button to correct any 'slippage' on the applet image.

It would be silly of me to attempt to write a page about gunnery. Firstly because I am a Communicator and not a Gun-Buster and secondly the subject is almost exhausted by the many competent authors who have answered all FAQ about gunnery from the earliest of days to the latest guided missiles used by present day navies. Therefore, my aim here is to simply state some facts relating to the boring end of this exciting subject, to show you how gunnery had progressed after lessons learnt at Jutland and the Falklands {WW1} had been analysed, and what equipment/facility was incorporated in our warships in the endeavour to keep our fighting capability well ahead of all other navies; whether that was achieved is for the 'professionals' to argue about, however, with a little help from the RAF [and the Germans themselves] it was the Royal Navy who cleared the seas of German surface units. I have many heroes, but one in particular for me is the DESTROYER OF THE BISMARCK who in Nelson-fashion signalled to units in company from his Flagship HMS King George V, "CLOSE THE RANGE. GET CLOSER...GET CLOSER...I CAN'T SEE ENOUGH HITS". Despite a 'slow' start, our great Admiral Sir John Tovey {known as Splashguts} [later Admiral of the Fleet Lord Tovey] did what all the world desired and what every British person DEMANDED; he sank the Bismarck, good and dead. This is Admiral Tovey in an informal appearance  **and this is Admiral Tovey. the boss, on his Flagship KG V**  **. I managed to find his obituary which had been printed in all the national's. However here is the one from the Daily Telegraph. He died in 1971.**  **This picture shows him as an Admiral of the Fleet taken at some point between 1943 and his retirement in 1946**

There is no bias towards any one weapon or armament, and 'bring all guns to bear' is the overall theme. However, I do find big guns more interesting than little guns or torpedoes [fired from ships] although the Scharnhorst and to a lesser degree the Bismarck might swallow at that [!], but few can deny that a ship or group of ships protecting themselves against air attack by throwing pom pom or 4-inch high angle [HA] gun projectiles skywards, is to say the very least, exciting, and usually, my preferred big low angle [LA] guns, are resting motionless whilst all around the ship their little friends are working flat out to see off the airborne enemy. Thus, each group HA and LA have their own very important part to play in destroying the enemy.

Returning to those big guns, the Royal Navy employed three different calibre namely 16-inch, 15-inch and 14-inch with a mixture of 8-inch and 6-inch [still big guns especially by today's standards]. The 'smaller' guns were the 5.5-inch, 5.25-inch, 4.7-inch, 4.5-inch, 4-inch and the 2 pounder pom pom. There were many various combinations, but in simplistic terms, it can be said that the big guns were the main armament of battleships and battlecruisers, the middle range [8 and 6-inch] the main armament of cruisers and the destroyers, frigates, sloops, escorts had the smaller calibre guns as their main armament. All classes of ship had the smaller calibre guns as AA [anti aircraft] [HA] secondary armaments, complimented of course by the proverbial pom pom, although in smaller vessels, of necessity, their one or two main armament guns functioned as both HA and LA attacking guns.

To assist you with the deployment of the big guns, the following table shows who had what.

CLASS OF SHIP	TYPE OF SHIP	TIME OF SERVICE	SHIPS IN CLASS	CALIBRE OF GUN	ARRANGEMENT OF TURRETS	FATE
Revenge	Battleship	Pre WW1	Ramillies Revenge Resolution	15-inch	4 turrets AB and XY each with 2 guns. 8 guns.	[RA] Scrapped 1948

			Royal Oak Royal Sovereign		{CLICK TO ENLARGE} 	[RE] Scrapped 1948 [RES] Scrapped 1948 [RO] Sunk 1939 [RS] Scrapped 1949
Renown	Battlecruiser	Mid WW1	Renown Repulse	15-inch	3 turrets ABY each with 2 guns. 6 guns. {CLICK TO ENLARGE} 	Scrapped 1948 Sunk 1941
Queen Elizabeth	Battleship	From WW1	Barham Queen Elizabeth Valiant Warspite Malaya	15-inch	4 turret ABXY each with 2 guns. 8 guns. {CLICK TO ENLARGE}  	[B]Sunk 1941 [QE]Sunk 1941 [V]Sunk 1941 but raised and repaired. Served until 1944 [W] Damaged, not fully repaired, heavy coastal bombardment ship at Normandy Landings. [M] Scrapped 1948
Hood	Battlecruiser	From 1920	Hood	15-inch	As above {CLICK TO ENLARGE} 	Sunk 1941
Nelson	Battleship	From mid 1920's	Nelson Rodney	16-inch	3 turrets forward each with 3 guns. Turrets ABC. 9 guns. {CLICK TO ENLARGE} 	Scrapped 1949 Scrapped 1948
KG V	Battleship	From late 1930's	King George V Anson Howe Prince of Wales Duke of York	14-inch	2 turrets forward AB 'A' with 4 guns and 'B' with 2 guns; 1 turret aft Y with 4 guns. 10 guns. {CLICK TO ENLARGE} 	[KGV] Scrapped 1958 [A] Scrapped 1957 [H] Scrapped 1958 [POW] Sunk 1941 [DOY] Scrapped 1957

Notes:

1. **Look at the FATE column to see what a DREADFUL year 1941 was for the Royal Navy**
2. **As a comparison only, the German navy [big hitters] are shown in the following table.**

NAME OF SHIP	CALIBRE OF MAIN ARMAMENT	CONFIGURATION	FATE
Tirpitz Bismarck	14.96-inch [38cm]	4 turrets, 2 forward and 2 aft, with 2 guns per turret. 8 guns {CLICK TO ENLARGE} 	Sunk 1944 Sunk 1941
Scharnhorst Gneisenau	11-inch [28cm]	3 turrets two forward 1 aft 3 guns per turret. 9 guns {CLICKTO ENLARGE} 	[S] Sunk 1943 [G] Badly damaged by the RAF in Kiel in 1942 and never went to sea again.
Deutchland but changed to Lutzow after 1939, Admiral Scheer Admiral Graf Spee	11-inch [28cm]	2 turrets, 1 forward and 1 aft, 3 guns per turret. 6 guns. {CLICK TO ENLARGE}  	[L] Sunk 1945 [AS] Sunk 1945 [AGS] Scuttled 1939.

Notes:

1. **Apart from the Tirpitz and the Bismarck, compared with the British, small calibre main armament suited for destroying merchant ships [surface raiders] but not fighting our battleships and battlecruisers, and invariably, the 11-inch ships would stay well clear of our big guns unless cornered.**
2. **The story would not be complete without briefly mentioning the maximum calibre guns of the USN, the Italian Navy and the IJN which were respectively either 14-inch or 16-inch guns with one older battleships having 12-inch guns: the Italians favoured 15-inch guns in their battleships and the Japanese got to as high as 18.1-inch guns in their two 72,000 ton battleships the Yamato and the Musashi, each having 9 guns in 3 turrets, the total weight of the turrets was 2,500 tons the weight of a decent sized WW2 destroyer. However, such a "brief" visit would not do justice to another lady, which our chief ally and good friends {outside that most revered bunch of Commonwealth navies} the Americans, but specifically the United States Navy [USN] call the MIGHTY 'W', as we called/call our largest warship HMS Hood, the MIGHTY HOOD. The MIGHTY 'W' refers to the USN battleship the USS WASHINGTON {BB56}. The USN knows a few things about BIG GUNS and certainly the MIGHTY 'W' packed one hell of a punch. This marvellous applet comes from the President of the USS WASHINGTON BB56 Associate Unit, Inc., one Howard Wright. I am very grateful to Howard for allowing me to use his work.**

Click on image to silence - Image provided by USS Washington BB56

{Note that the SOUND file has a finite number of repeats and then turns off. To hear the sounds again, reload the page}

In the following pictures, the first two are the top and bottom parts of one table, and pictures three and four of a second table. They show the Great Britain Armoured Ships details and parameters for 1924. Top  Bottom  . However, in the following year they [the publishers] had altered the first column [the Ships Name] by adding a date for scrapping the vessel. Bearing in mind this is 1925, look at the scrapping date for HMS HOOD. Isn't that strange and weird? Top  {REMEMBER That there were two KG V's, WW1 and WW2} Bottom  . These were the navy estimates for 1919-1920 at the time when the Hood was about to start her life as the Mighty Hood. 

Now, what is gunnery all about and what makes a gun an accurate killing machine or just a noisy old length of pipe? The following file will give you all the answers to that question with 'modern' history thrown in. It is in three parts for ease of reading and download speed. The information here is taken from CB's and BR's [so it is proper Navy coming out of the Admiralty], in issue at the very beginning of WW2 {1939} up to and including the near end of the war in early 1945, and addresses the problem of low angled [LA] or surface gunnery - shooting at another ship or a target on the mainland. High angled gunnery [HA] or shooting at aircraft is published later on. USE THE PDF BOOKMARKS TO HELP YOU NAVIGATE.

Gunnery Directors Part 1.pdf Gunnery Directors Part II.pdf Gunnery Director Part III.pdf

After that most interesting and informative read, comes the actual lists of who got what, when, and why. The next file comes in four parts, and for the true devotees, there is a great deal of detail to take in. The first table above will help you here, for when it mentions, say, the "Nelson" class, you will know to which ship's the article refers. What you see and read here is the state of fit when the 'fighting war' was nearly one year old i.e. in August 1940 [the war proper lasted for over eleven years and all hostilities were considered to be over and full peace was declared with Germany by all the Allied Forces at 4pm on the 10th July 1951]. Directors Various Part I.pdf Directors Various Part II.pdf Directors Various Part III.pdf Directors Various Part IV.pdf

The story, and fate of HMS HOOD polarises our minds to big guns and the damage they can inflict, albeit, a 'lucky shot' into an elderly and not best protected [armour] battlecruiser. Her assailant was herself rendered defenceless by gun fire from the Rodney and the King George V before she was finally slaughtered by torpedoes from the Dorsetshire*. Therefore, I will pick out any points of interest in the CB's and BR's which apply to Hood either collectively as "capital ships" or as "battlecruisers" or by her name alone.

*** THIS SNIPPET comes from my web page The Royal Navy Warrant Officer Part III and refers to the captain of the Dorsetshire. Also in 1910, Lieutenant N.F. Usborne had drafted a paper about promotion where young leading seamen and petty officers be promoted acting warrant officers, undertake courses with sub-lieutenants and later be promoted to lieutenants. Churchill urged Fisher to consider the matter, and in 1912 Churchill announced to the House and to the navy, his scheme. It was accepted on both sides of the House and immediately put into practice. This initiative emerged as the MATES SCHEME, by which selected warrant officers and qualified petty officers were given a round of specialist courses, with subsequent promotion to the wardroom as mates before becoming lieutenants. The problems was that to be eligible one had to be below the age of 30, and that ruffled feathers amongst the 'old and bold' warrant officers, the very men who had been complaining for years. Still, the scheme went ahead, but it was not an unqualified success as you can imagine. Whatever ones view, it was a break through, and by 1914 some forty four mates had started to 'climb the ladder' and no fewer than two hundred young warrant officers had been promoted to chief warrant officer after fifteen years service. Internally things were looking up at long last, but externally, the war clouds were about to burst. The outbreak of war did wonders for the Mates. Thirty five were at sea and a further twenty six finishing course ashore, including the very first engineer Mate [E]. As planned, in 1913 the first mates were promoted to lieutenant and from then on the demand for officers was so great that over one hundred per year qualified, and three became flag officers.**

It might seem to you a long time ago since you started this page, and that the first interactive thing you did was to click on a 'click here' prompt. On that new page which showed warrant officers stripes in the middle of the page and wardroom officers stripes to the right of the page, I mentioned the captain of HMS Dorsetshire and that he was a 'ranker'. Do you remember? Dorsetshire torpedoed the Bismarck on the port side and then on the starboard side from close range. Captain Benjamin C.S. Martin was one of the mates I have described above. A bright young petty officer who became an acting warrant officer [a gunner] 28th May 1915 - a mate [sub lieutenant stripe] 13th October 1916 - a lieutenant 13th May 1919 - a lieutenant commander 13th October 1926 - a commander 30th June 1935 and a captain 31st July 1939. Benjamin Martin achieved Flag Rank and eventually the KBE. Later, on the 5th April 1942, then under Captain A.W.S. Agar VC RN., the Dorsetshire was lost to Japanese aircraft off Ceylon with the loss of over two hundred souls: the Captain was wounded in action [WIA].

The gunnery control system for the Hood is described on the Hood website http://www.hmshood.com/ which is a well presented, almost academic presentation. What it does as much as anything is to remind us the Hood was a one-off in just about every sense, not least her gunnery control and fire system but the very type of guns [main armament] she had were unique, and remember that lots of ship's also had 15-inch guns. However, the finding in these CB's and BR's reveal 'small' differences to what appears on the Hood website and it is possible that we are talking about the same facility but expressed under a different heading, the ones here from August 1940 and the ones on the Hood site possibly from an earlier period.

In the Directors Various file [in four parts] above, you will see on pages 1-11, appendix 1, that ships older than the Hood are regularly mentioned [Renown, Valiant and Queen Elizabeth for example] as are ships younger than Hood [Nelson and Rodney] but not the Hood herself, until it comes to the bottom of page 4. There it mentions Directors for pom-pom guns MK 'M', saying that the Hood got one in the first batch issued namely the Mk 1*. Hood had three pom pom mountings, and page 5 completes the story giving Hood a further two Directors, a Mk 1and a Mk 2 which was fitted with C.O.F.A.S. [Control Officers Forward Area Sight]. At this time period [August 1940] just about the whole of the "big ship fleet" is now fitted with pom pom Directors, and Hood has one for each mounting.**

Continuing with HA Directors and still on page 5, we see that Hood is fitted with a very modern HACS [High Angle Control System] Mk III* [note the Star] again across-the-board big ship fit, with the AA cruisers and escort vessels also fitted. This will almost certainly be the main Director for the 4-inch Mk XVI HA double barrel guns for Hood and other big ships, and a HA/LA for smaller ships, this despite its name of HACS. [See the HACS handbook file below]. The HACS III* came with a very sophisticated calculating table [pictures later] and the configuration between the HACS III* and the AFCC Mk VIII became known as the HACS IIIc Table.

Notwithstanding Hoods uniqueness mentioned above, she is by this time being 'dragged' into the modern world.

Pages 7 and 8, by virtue of Hood having HACS III* fitted, shows the ship with one or two telescope enhancements to her Directors, whilst page 10 includes an enhancement to her Gyro Oil Unit.

Page 11 shows a modern Dial Sight for 15-inch directors - periscopic sight.

So much for Directors. Now to Elevation Receivers. The Type 'C' [or variant] would have been fitted in Hood [pages 12 and 13] but I am not sure which one, possibly a Mk II, Mk III, Mk IV, Mk V, type CM Mk I, CM Mk I*. Later, you will see a picture of the Type CM.

Moving on to Training Receivers. There is a picture showing a type C Training Receiver. Once again, either a Type C or a Type CM could have been fitted in Hood.

THE FIRE CONTROL BOX MARKS IV AND IV* - JUNE 1940.

The Fire Control Boxes, Mk IV and IV* are designed as the LOCAL CONTROL arrangements for CAPITAL SHIPS' MAIN ARMAMENT. The Mk IV* box is fitted in the CONTROLLING TURRET and differs from the Mk IV in that it contains convergence mechanism for the AFTER TURRET and the necessary elevation and training to OTHER TURRETS. In order to obtain the desired accuracy in the gun training transmission in the Mk IV* box, the gear ratio in this drive is different from that in the Mk IV box. All capital ships built after the Hood [Nelson Class, KG V Class, Vanguard] had the AFCT [Admiralty Fire Control Table] for controlling LA main armament guns incorporating the AFCC Mk VIII - Admiralty Fire Control Clock], whilst the Hood had a Dryer Table which in reality incorporated post-Jutland technology and lesson learning techniques. It is also highly probable that the FC systems in the Revenge Class, the Renown Class and the Queen Elizabeth class all more or less pre-Jutland thinking, had been taken out and replaced by the AFCT/AFCC. Whilst the FCB Mk IV* [designed for the KG V] shows three turret only AB and Y it surely cannot have been difficult to add X turret wiring/controls for 15-inch guns, Hood, for example, so that her guns could be used in LOCAL CONTROL: - see the Hood website and particularly read their article about TURRET TABLES, in this case, mini-Dryer Mk V tables. Were this to have happened, Hood would have had FOUR systems viz the elderly Dryer Table for LA main armament central control firing, the FCB Mk IV* for main armament firing locally controlled, the HACS Mk III* system for HA firing or LA firing with the quick firing [QF] 4-inch twin barrel guns and the Directors for her pom poms.

This FCB was fitted into ships having 14-inch guns, namely the King George V class [see above in top table], and it was she, the KG V, who along with the Rodney [16-inch guns], crippled the Bismarck [nominally 15-inch guns - see above in second table]. Therefore, it is worth a brief look at one of the KG V's main armament controlling systems.

First, here is a picture of what the table looked like FIRE CONTROL BOX MK IV*  **FOR CAPITAL SHIPS.** [FCB ONE.JPG]. **HERE IS A TYPICAL CONFIGURATION FOR A NON-CAPITAL SHIP WITH THE FIRE CONTROL BOX MK II FITTED**  [FCB ONE ALFA.JPG]**.**

Next the FCB proper. The plates referred to are much too large for the internet some nearly double A3 size. I have published two JPG Pictures [in addition to text and drawings integral thereto], one to show the FCB Wind Deflection Calculator and the other to show the FCB Layer's and Trainer's Sights.

Remember to use the BOOKMARKS within the PDF files for easier navigation.

FIRE CONTROL BOX TWO.pdf FIRE CONTROL BOX THREE.pdf FIRE CONTROL BOX TRAINER AND LAYER GUN SIGHTS

 [FCB FOUR.JPG] **FIRE CONTROL BOX WIND DEFLECTION CALCULATOR**  [FCB FIVE.JPG]

THE HACS [HIGH ANGLE CONTROL SYSTEM] MK III* FITTED WITH THE HACS IIIc TABLE

The following pictures of the HACS Mk III Table are thumbnails. Click on them to enlarge.      . **Each Table had its own Director, or put another way, each Director had its own Table. The following pictures show the general arrangements of the HA and HA/LA Mk III* Directors as fitted in the Hood for example. The following three pictures, when printed and joined together form a picture showing the 'SIDE' and 'REAR' views of the Director [left and right respectively]**

[LEFT HAND PAGE]  , [MIDDLE PAGE]  , [RIGHT HAND PAGE]  . **The next three pages, printed and joined, form a picture of the 'PLAN' of the Director.** [LEFT HAND PAGE]  , [MIDDLE PAGE]  , [RIGHT HAND PAGE]  . **The operation of the HACS III* and IIIc System is explained in the following two files HACS III AND IIIC PART ONE.pdf and HACS III AND IIIc PART TWO.pdf both with generous amounts of internal bookmarks.**

Well doing this type of page has been a departure for me, but as you may have noticed, I like to do as many naval subjects as possible. I hope that it gives you some insight into the gunnery of WW2 at sea, and for the purists amongst you, the true gun-busters, I hope that it brings back memories.

Please prolong your visit to the HMS HOOD website which most of us revere as a National Naval Shrine.

Farewell and Yours aye.